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M. Panikraz 6/7/94

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## DISPOSITION FORM

M. Panikraz, TSM, FSS-16, 6/7/94  
(Sig. of person authorized to change title, org., date)

JA 3.2000 Dep 6.2 FSS-16 6/7/94

FILE NO.

18651

SUBJECT

(Sig. of second reviewer, title, organization, date)

Weather Phenomena Resulting from Megaton Detonations

TO

CJTF 7

FROM

Staff Weather Officer

DATE

4 March 53

COMMENT NO. 1

THRU: ACoS, J-3

400412

1. Investigation of subject has continued along the following lines

a. Dr. C.E. PALMER has completed preliminary theoretical investigation including interpretation of certain photographs selected from Lookout Mountain Laboratory files. Dr. Palmer has indicated that he will complete a paper on the subject about 1 April.

b. LCDR W.J. KOTSCH has completed a comprehensive atmospheric stability analysis for both MIKE and KING and his findings have been delivered to this headquarters.

c. Mr. Francis PORZEL, of LASL, is examining evidence from continental tests. Available evidence supports our preliminary findings of the circulation we suspect is induced by a large explosion. Mr. Porzel has agreed to summarize his findings and forward them to this headquarters.

d. CDR PATE is coordinating the entire effort (the scope of which has been greatly enlarged since original concept) and will edit and assemble final report. In addition, he will summarize operational considerations and make certain recommendations. It is expected that the final report will be completed by 1 June.

2. In the interim, because of serious implications with respect to CASTLE, the following conclusions are presented as a preliminary report:

a. All available evidence, including weather logs and photographs, definitely shows that MIKE detonation induced atmospheric circulation which changed the weather over a wide area for about 6-8 hours. Weather before and after the shot was entirely different. Specifically:

(1) Cloud tops increased from relatively low levels to 30-35,000 feet.

(2) Several layers of intermediate cloud were formed.

(3) A high overcast (38-40,000 feet) was produced.

(4) The circulation induced, as shown by photographs and sketches made at the time, closely resembles both the idealized textbook model of both the tornado and typhoon. Energy released through the condensation of entrained atmosphere was on an enormous scale, dwarfing the energy released by the MIKE device itself.

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ATOMIC ENERGY ACT - 1946

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16-54801-8

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F-18651A SECURITY INFORMATION

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FILE = 150-17

A-91-048

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# DISPOSITION FORM

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CLASSIFICATION (U/Sec)

~~SECRET~~

FILE NO.

SUBJECT

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THRU: ACofS, J-3

b. Operationally, the "home-made" weather complicated the sampler operation due to unfavorable cloud amount at "wrong" altitudes.

c. All evidence indicates that MIKE cloud stem penetrated to a final altitude of about 125,000 feet and that by far the major portion of atomic debris was carried well into the stratosphere.

3. Because of all of the unknowns in the problem the following is recommended for all future detonations of devices in the megaton range:

That the primary weather consideration be the forecast of a definitely "dry" day (such as just after a fresh "trade" outbreak), with lower than usual atmospheric moisture and considerable vertical stability.

4. This recommendation, if adopted, will require de-emphasis of the radiological safety requirement for a southerly wind aloft, as such a wind structure is generally accompanied by increased moisture and decreased stability. While such a recommendation might be viewed with alarm at first glance, one important fact should be considered in weighing the recommendation:

With extremely high yields, most of the radioactive debris is carried into the stratosphere, where it is "trapped" and falls out very slowly, thus undergoing normal processes of decay, mixing and dispersal. All past sampling operations bear out this conclusion, as does the results of the world-wide fall-out program.

5. The recommendation, if adopted in whole or in part, could be made simpler from an operational standpoint if high yield devices were detonated earlier in CASTLE, leaving the lower yields for the latter part. This is true because of the probability of having a dry and stable atmosphere during February and March, with increasing moisture and more frequent southerly winds aloft during the latter part of March and all of April.

*E. W. Pate*

E. W. PATE

CDR, USN

Staff Weather Officer

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From  
NMB-J

JO-307

May 28, 1957

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J. E. Reeves, Test Manager  
Albuquerque Operations Office  
U. S. Atomic Energy Commission  
P. O. Box 5400  
Albuquerque, New Mexico

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Dear Mr. Reeves:

One of the prime requirements for firing a large device at the KPG is that the radioactive material falls out in uninhabited areas close to the proving ground. In order to be sure that this condition will be satisfied, JTF 7 and the AEC have set-up a weather observation net and a weather central to allow proper prediction of the wind vectors at all altitudes and points of interest. In addition to this, the AEC through its laboratories, has established a Fallout Prediction Unit responsible for determining to the best of their ability where the fallout material will go under any wind condition.

There are two large uncertainties in the present prediction system. The first and most important of these is simply the fact that the analysis of observed weather information to produce a wind map is a long and tedious hand operation performed by as many as thirty people. It normally takes from four to five hours to accomplish this analysis after the observations are taken. Since weather observations over the whole Pacific weather system are taken every six hours, we quite often find ourselves in the situation of using weather information as much as twelve hours old to decide whether a shot should be fired.

In an attempt to improve this situation, Messrs. Stopinski and Israel of the LASL have developed a code to set weather information directly into an IBM 704 calculating machine which then, with the appropriate extra attachments, can produce a weather map in a few minutes. The presently developed system is not satisfactory; however, it is sufficiently promising that I believe by the time of Hardtack an adequate code will be developed. The safety of the Pacific operations will be greatly increased if we can properly use the latest observed winds before firing a large shot.

DEPARTMENT OF DEFENSE	6/17/94
TEST REVIEWER DATE	6-17-94
AUTHORITY	APR 1957
NAME	APR 1957
DATE	6-17-94
AUT	APR 1957

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To: J. E. Reeves

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May 28, 1957

The second problem is the prediction of the fallout pattern taking into account the space and time variation of the wind pattern as the radioactive material is falling. Putting in this variation into the calculation by hand takes too much time to be of any practical value. However, I believe that the Fallout Prediction Unit can develop by the time of Hardtack 704 code which will allow this calculation to be done by machine and thus increase materially the safety of firing. I should point out that it was exactly the lack of this type of calculation that led to our difficulties on the Test Shot of Operation Raining.

While I cannot guarantee that either of the above calculational methods will be successful by the time of Hardtack, I believe that the probability of their success and the tremendous value to the safety of the operation is such that we should bend every effort to accomplish these gains. As you know, it is necessary to order the 704 now if we are to have it at Hardtack.

It is expected that the rental cost of the 704 will be \$35,000 - \$45,000 per month. I would expect the machine will be needed for approximately six months. I understand however, that the outright purchase price of a 704 is approximately three million dollars. The rental price includes engineers to operate and maintain the machine - the purchase price does not. We do not have a source of people to maintain the 704. It is not at all clear that a 704 will be desirable after Hardtack since other cheaper and simpler machines are now being built. Thus, it appears clear that we should not consider the outright purchase of the 704, but should only rent it for the duration of the Hardtack Operation.

I trust the above is a sufficiently lengthy dissertation on the need of the IBM 704 machine. If there are other questions concerning this machine, I will be happy to attempt to obtain the answers you desire.

Sincerely,

Wm. Ogle  
Alternate J Division Leader

WO:el

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